

Hardware Demonstration of a Joint Human/Automated Upset Recovery System, Phase I

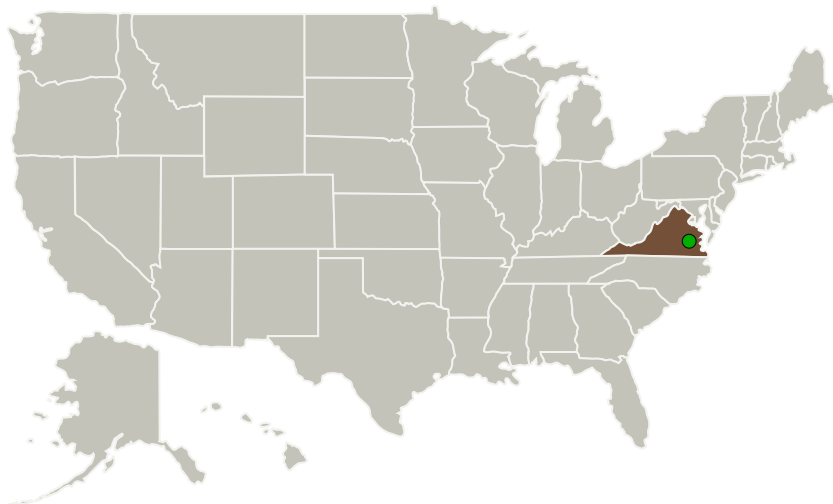
Completed Technology Project (2010 - 2010)



Project Introduction

For manned aircraft, loss of control in flight and controlled flight into terrain are two main causes for aviation accidents. Recently, the authors have developed systems that autonomously execute recovery strategies to rapidly restore nominal flight without overcommanding the aircraft, exacerbating the upset condition, or endangering nearby structures and vehicles. The opportunity exists to extend the automated recovery system (ARS) by incorporating it in manned aircraft in a way that collaborates with the crew about corrective actions and utilizes crew expertise in real-time to provide the most effective recovery. The proposed research will develop and demonstrate such crew-specific extensions to show the benefits of a collaborative human/automated (H/A) upset recovery system. Metrics will be defined to evaluate mixed H/A team performance both in terms of performance and crew experience, and a variety of levels of autonomy will be implemented including manned recovery, ARS advisory mode, human oversight of ARS autonomy, and fully autonomous mode. A key goal is to demonstrate that a mixed H/A mode will provide significant advantages over what can be achieved by either the pilot or the fully autonomous system alone. Toward this end, human-in-the-loop hardware demonstrations will be used to demonstrate the benefits of joint H/A approaches and to set the stage for Phase II flight demonstrations.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Barron Associates, Inc.	Lead Organization	Industry	Charlottesville, Virginia
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations

Virginia

Project Transitions

**January 2010:** Project Start**July 2010:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140514>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Barron Associates, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

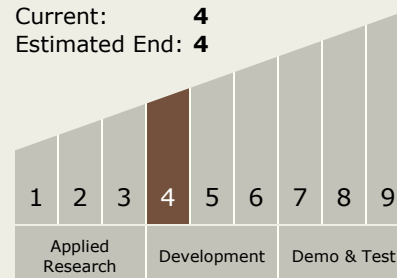
Richard Adams

Technology Maturity (TRL)

Start: 4

Current: 4

Estimated End: 4



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Technology Areas

Primary:

- TX10 Autonomous Systems
 - └ TX10.2 Reasoning and Acting
 - └ TX10.2.6 Fault Response

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System